ASTR 201 - Stars, Galaxies and the Universe
Fall 2014

Instructor: **Prof. Stephen Bradshaw (302 Herman Brown Hall, ext. 4045)**
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Class Website: **Owl Space**
Lectures: **Tuesday and Thursday, 9:25am – 10:40am, ABL 131**
Office Hours: **After each class and by email appointment**
Teaching Assistants: Shane Alpert, Shanshan Bao, Arpan Bhowmik

Course Description

This course is intended to provide an introduction to the fundamentals of modern astronomy and the underpinnings of our understanding of our place in the universe. The course is designed to satisfy Group III distribution requirements. Students majoring (or intending to major) in astronomy / astrophysics are better served by the courses ASTR 350 (Introduction to Astrophysics - Stars) and ASTR 360 (Introduction to Astrophysics – Galaxies and Cosmology). If you are currently undecided about your major then this course and its companion ASTR 202 (Exploration of the Solar System) are good places to begin determining where your interests lie.

Stars, Galaxies and the Universe starts with an overview of the universe and our place within it, before embarking upon an exploration of the cosmos to encounter: the birth, life and death of stars; the formation and evolution of galaxies; and the origin, large scale structure and the future of the universe. Along the way we will learn about some of the history of astronomy and the interesting characters who led its development. We will also study many of the fundamentals of astronomy such as the motion of celestial bodies, why understanding these motions matters to us on Earth, and how we came to know much of what we know about the skies thanks to the invention of the telescope.

During the course we will review and emphasize basic physics such as forces and motion, conservation laws, energy and temperature, and the interaction between light and matter, all of which are needed to understand the fascinating objects that we see in our skies.

Prerequisites

No scientific or mathematical background beyond high school physics and algebra is assumed. The homework problem sets will not require calculus, but will involve equations and making calculations. Remember that they are designed to reinforce what you learn, not to catch you out. Examples relevant to the homework problem sets will be worked through during class.

Course Textbook

The text for this course is:

The Cosmic Perspective: Stars, Galaxies and Cosmology (7th edition);
by Bennett, Donahue, Schneider and Voit;
published by Benjamin Cummings;
ISBN-10 0321841077;
ISBN-13 978-0321841070.

If you are also planning to take ASTR 202 (or think you might) then you may instead purchase the following text:

The Cosmic Perspective (7th edition);
by Bennett, Donahue, Schneider and Voit;
published by Benjamin Cummings;

ISBN-10 0321839552;
ISBN-13 978-0321839558.

The first book contains only the material that we will cover in ASTR 201. The second book contains all of the material for ASTR 201 and ASTR 202. Both books come with access to the website MasteringAstronomy, which provides a large amount of supplementary course material that you are strongly recommended to make use of. If you have a used copy of either textbook then you can purchase access to the website separately at: www.masteringastronomy.com.

Note that the 6th edition of both textbooks is also available. The 6th edition is suitable for this course and significantly less expensive.

Class Website

All course materials including problem sets, links to relevant websites, supplementary material, and class updates and announcements will be posted on the ASTR 201 Owl Space page. It is the responsibility of the student to check Owl Space regularly for the most recent information concerning the class.

Special Needs

If you have a documented disability that requires special consideration for this class then please contact the professor as soon as possible to discuss your needs. Students with disabilities should also contact the Disability Support Services Office in the Ley Student Center (dss.rice.edu).

Assessment

The Honor Code applies to all assessment tasks. You can review Rice's Honor Council documentation online at: honor.rice.edu/index.cfm

Homework problem sets: There will be weekly problem sets with questions from the course text and other questions at the same level that will be based on the material covered during the previous week. A problem set will be posted on Owl Space each Tuesday and will be due in class (or immediately before class if submitted online) the following Tuesday. The problem sets will be take-home and open-book. You may (indeed, should) discuss general concepts with your classmates before attempting the questions, but your answers must be the result of your own understanding of the material and you should therefore write up the solutions to each problem set by yourself.

Popular science writing assignment: Features on astronomy often appear in the news and this short project is an opportunity for you to learn more about the science behind the stories. Choose a recent astronomy article that interests you from the popular media and then write a report about the science upon which it is based. Questions that you may like to consider in your report are: how much science does the journalist leave out of the article? Is the science that is included reported faithfully or is it misrepresented? Does the article give the non-scientist reader an accurate and honest account of the scientists' work? The report may contain pictures, diagrams and equations (as long as you can explain them in your own words), and be no more than 1000 words in length. You will be assessed on your understanding of the material (expressing what you have learned in your own words), the quality of your analysis and discussion, and your ability to connect the material with topics that we cover in class. Marks will be deducted for poor spelling and grammar because the ability to communicate clearly (in this case by the written word) is a critically important skill to develop.

You should keep your eye out for any interesting astronomy-based stories in the news. The Fondren carries the latest popular science journals (e.g. Nature, Science, etc.) and provides access to the online editions. A list of other sources is available on the Owl Space page (under ASTR 201 / Resources / News Sites), but is not exhaustive. You may, if you wish, check with the professor when you have chosen an article to make sure that it is suitable. This assignment will be due at the beginning of class on **Thursday 13th November 2014**.

Plagiarism will not be tolerated and the professor has no discretion about whether to report it. The procedure for dealing with cases of suspected plagiarism is manifestly unpleasant and stressful (for student and professor), and emphatically not worth the risk to your academic career and to your future. Your work should be clearly distinguishable from its sources and be a direct result of your own understanding of the material. For a guide to what constitutes plagiarism and how to avoid it please consult the Honor Council's document concerning academic fraud: honor.rice.edu/bluebook.cfm?doc_id=10355

Attendance and Participation

Students who attend class regularly will be at a significant advantage because material not included in the textbook or class presentations made available on Owl Space is often featured during class. Furthermore, the examples that will be worked through during class are directly applicable to the homework problem sets. You are expected to participate actively in class activities and to ask questions.

Grades

Task	Weighting
14 problem sets	70%
Popular science writing assignment	30%

The overall percentage grade (PG) will be calculated from the percentage grade awarded for each task, with the appropriate weighting. The letter grade will be determined from the overall percentage grade by:

$PG \geq 90\%$ (A±); $80\% \leq PG < 90\%$ (B±); $70\% \leq PG < 80\%$ (C±); $60\% \leq PG < 70\%$ (D±); $PG < 60\%$ (F)

You do not need to have a scientific background to get a high grade. However, you will need to work hard and regularly to achieve a top grade. This includes attending class, completing all of the problem sets and talking to the professor as soon as possible when difficulties arise. Misunderstandings can often be cleared up quickly and easily, but if left to fester they will adversely affect your grade and will spoil your enjoyment of the course.

Cellphones, Tablets, Laptop Computers, etc.

Cellphones must be switched off upon entering the classroom.

Laptop computers, netbooks, iPads, etc., may be used for the purpose of note taking only. Other activities are likely to be extremely distracting for others sitting nearby. If non-course-based electronic-device use becomes a problem during the semester then an in-class ban will be implemented.

Observing Sessions

The Rice University Campus Observatory (RUCO: http://www.ruf.rice.edu/~ruco/observatory.html) provides an excellent opportunity for hands-on stargazing. Nighttime observing sessions will be scheduled during the semester. However, as with most Earth-based astronomical endeavors, we are at the mercy of the weather and the local 'seeing' conditions. This means that observing sessions may be organized and cancelled at unavoidably short notice. The best nights for practical astronomy are clear and cold, so you are advised to dress warmly.

Continued on next page

Class Schedule (tentative)

August

(1) Tuesday	26th	-	Part I: Ch. 1. A Modern View of the Universe
(2) Thursday	28th	-	Part I: Ch. 1. A Modern View of the Universe

September

(3) Tuesday	2nd	-	Part I: Ch. 2. Discovering the Universe
(4) Thursday	4th	-	Part I: Ch. 2. Discovering the Universe
(5) Tuesday	9th	-	Part I: Ch. 3. The Science of Astronomy
(6) Thursday	11th	-	Part I: Ch. 3. The Science of Astronomy
(7) Tuesday	16th	-	Part II: Ch. 4. Making Sense of the Universe
(8) Thursday	18th	-	Part II: Ch. 4. Making Sense of the Universe
(9) Tuesday	23rd	-	Part II: Ch. 5. Light and Matter
(10) Thursday	25th	-	Part II: Ch. 5. Light and Matter
(11) Tuesday	30th	-	Part II: Ch. 5. Light and Matter

October

(12) Thursday	2nd	-	Part II: Ch. 5. Light and Matter & Part II: Ch. 6. Telescopes
(13) Tuesday	7th	-	Part II: Ch. 6. Telescopes
(14) Thursday	9th	-	Part II: Ch. 6. Telescopes & Part V: Ch. 14. The Sun
(15) Thursday	16th	-	Part V: Ch. 14. The Sun
(16) Tuesday	21st	-	Part V: Ch. 14. The Sun
(17) Thursday	23rd	-	Part V: Ch. 15. Surveying the Stars
(18) Tuesday	28th	-	Part V: Ch. 15. Surveying the Stars
(19) Thursday	30th	-	Part V: Ch. 16. Star Birth

November

(20) Tuesday	4th	-	Part V: Ch. 17. Star Stuff
(21) Thursday	6th	-	Part V: Ch. 18. The Bizarre Stellar Graveyard
(22) Tuesday	11th	-	Part VI: Ch. 19. Our Galaxy
(23) Thursday	13th	-	Part VI: Ch. 19. Our Galaxy
(24) Tuesday	18th	-	Part VI: Ch. 20. Galaxies and the Foundation of Modern Cosmology
(25) Thursday	20th	-	Part VI: Ch. 21. Galaxy Evolution
(26) Tuesday	25th	-	Part VI: Ch. 22. The Birth of the Universe

December

(27) Tuesday	2nd	-	Part VI: Ch. 23. Dark Matter, Dark Energy, and the Fate of the Universe
(28) Thursday	4th	-	Part VI: Ch. 23. Dark Matter, Dark Energy, and the Fate of the Universe

Continued on next page

Summary of Problem Set and Written Assignment Deadlines

Deadlines are strictly enforced. Requests for extensions must be granted by the professor (by email, so that a written record exists) BEFORE the due date of the assignment. You will need a valid reason accompanied by supporting documentation.

September

(3) Tuesday	2nd	-	Problem Set 1 (C1-2) released.
(5) Tuesday	9th	-	Problem Set 1 (C1-2) due. Problem Set 2 (C3-4) released.
(7) Tuesday	16th	-	Problem Set 2 (C3-4) due. Problem Set 3 (C5-6) released.
(9) Tuesday	23rd	-	Problem Set 3 (C5-6) due. Problem Set 4 (C7-8) released.
(11) Tuesday	30th	-	Problem Set 4 (C7-8) due. Problem Set 5 (C9-10) released.

October

(13) Tuesday	7th	-	Problem Set 5 (C9-10) due. Problem Set 6 (C11-12) released.
Tuesday	14th	-	Problem Set 7 (C13-14) released.
(15) Thursday	16th	-	Problem Set 6 (C11-12) due.
(16) Tuesday	21st	-	Problem Set 7 (C13-14) due. Problem Set 8 (C15) released.
(18) Tuesday	28th	-	Problem Set 8 (C15) due. Problem Set 9 (C16-17) released.

November

(20) Tuesday	4th	-	Problem Set 9 (C16-17) due. Problem Set 10 (C18-19) released.
(22) Tuesday	11th	-	Problem Set 10 (C18-19) due. Problem Set 11 (C20-21) released.
(23) Thursday	13th	-	Written assignment due.
(24) Tuesday	18th	-	Problem Set 11 (C20-21) due. Problem Set 12 (C22-23) released.
(26) Tuesday	25th	-	Problem Set 12 (C22-23) due. Problem Set 13 (C24-25) released.

December

(27) Tuesday	2nd	-	Problem Set 13 (C24-25) due. Problem Set 14 (C26) released.
(28) Thursday	4th	-	Problem Set 15 (C27-28) released.
Thursday	11th	-	Problem Sets 14 (C26) and 15 (C27-28) due no later than 5pm.

Notes: (CX-Y) indicates that the questions will be based only on the material covered in classes X to Y.